PATENT
Attorney Docket No. 4034.0018-02

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Chisato KATO et al.

Continuation of Serial No.: 08/016,979,
filed February 12, 1993

Group Art Unit: ~~2306~~ 2121

Serial No.: Not Yet Assigned

Filed: January 8, 2001

Examiner: ~~B. Oakes~~ S. Rao

For: APPARATUS AND METHOD FOR FEEDBACK-ADJUSTING WORKING CONDITION FOR IMPROVING DIMENSIONAL ACCURACY OF PROCESSED WORKPIECES

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

PRELIMINARY AMENDMENT

Prior to examining this Rule 53(b) continuation application, please amend the application as follows:

IN THE DRAWINGS:

Subject to the approval of the Examiner, it is proposed to amend Figs. 17, 34c and 36 of the drawings as indicated in red on the attached prints.

IN THE SPECIFICATION:

Please amend the specification as follows:

Page 3, line 7, change "acts" to --act--.

Page 4, line 15, change "provides" to --provide--.

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Page 6, line 6, change "accuracy" to --error--.

Page 12, line 9, delete the first occurrence of the word "the".

Page 18, line 6, delete "is provided".

Page 32, line 4, change "mans" to --means--; and

line 11, change "compensating coefficient" to --compensating value--.

Page 45, line 23, delete "connected to".

Page 50, line 12, delete "measured" (second occurrence).

Page 54, line 9, after "34B" insert --34C--.

Page 56, line 25, change "post-measuring" to --post-process measuring--.

Page 63, line 15, change "optically" to --optimally--.

Page 85, line 26, after "derivative" insert --D--.

Page 91, line 22, change "nm_{ax}" to --n_{max}--.

Page 92, line 8, change "number r" to --number--.

Page 103, line 21, change "roughing" to --rough–

Page 109, line 4, change "eight" to --eight--;

line 5, change "112" to --114--;

line 10, change "16" to --116--; and

line 27, change "16" to --116--.

Page 123, line 13, change "change" to --changes--.

Page 125, line 23, change "(c) and" to --and (c)--.

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Page 132, line 12, change "PM" (second occurrence) to --"PB"--.; and

line 23, change "adjust" to --adjusting--.

Page 135, line 11, change "journals X" to --journal--.

Page 137, line 10, change "is" to --be--.

Page 138, line 10, change "workplace" to --workplaces--.

Page 142, line 22, after "compensation" insert --is limited--.

Page 150, line 13, delete "not".

Page 172, line 27, delete ""ON"".

Page 173, line 25, change "all to --an--.

Page 174, line 10, change "99" to --S99--.

Page 175, line 17, change "144" to --114--.

Page 180, line 27, change "28-54" to --27-54--.

Page 185, line 13, delete "a" (second occurrence).

IN THE CLAIMS:

Please cancel claims 1-46 without prejudice.

Please add the following new claims:

--47. A working system comprising:

(a) a working machine for successively processing workpieces;

(b) machine control means for determining a working condition of said working machine on the basis of an extraneous signal, and controlling said working machine according to the determined working condition;

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(c) a measuring device for measuring actual dimensions of working portions of the workpieces processed by said working machine; and

(d) a feedback compensating apparatus used with said machine control means and said measuring device, said feedback compensating apparatus including:

determining means for determining, as the extraneous signal, a compensating value for adjusting the working condition of said machine for the workpiece to be processed subsequently by said machine, on the basis of the actual dimensions of the working portions of the workpieces which have been measured by said measuring device, and according to a compensation rule, the compensation rule changing such that the compensating value to be determined according to the compensation rule is less responsive to a change in the actual dimensions of the processed workpieces when a frequency of a variation in a time of measurement of the actual dimensions successively obtained by said measuring device is higher than a threshold value, and the compensating value to be determined is more responsive to the change in the actual dimensions when the frequency of variation in the time of measurement is equal to or less than the threshold value; and

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applying means for applying the compensating value to said machine control means.

48. The working system of claim 47, wherein said feedback compensating apparatus includes memory means for storing data representative of a plurality of control rules, and means for selecting as the compensation rule one of the plurality of control rules depending on the frequency of the variation in time of measurement.

49. The working system of claim 47, wherein said feedback compensating apparatus includes means for measuring the frequency of the variation in time of measurement, adjusting a predetermined compensation rule depending upon the frequency of the variation in time of measurement, and determining the compensating value according to the adjusted compensating rule.

50. A method of processing a plurality of workpieces by a working system including a working machine for successively processing the workpieces, machine control means for determining a working condition of said working machine on a basis of an extraneous signal, and controlling said working machine according to the determined working condition, and a measuring device for measuring actual dimensions of working portions of the workpieces processed by said working machine, said method comprising the steps of:

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determining in said machine control means, as the extraneous signal, a compensating value for adjusting the working condition of said machine for the workpieces to be processed subsequently by said machine, on the basis of the actual dimensions of the working portions of the workpieces which have been measured by said measuring device, and

according to a compensation rule, the compensation rule changing such that the compensating value to be determined according to the compensation rule is relatively less responsive to a change in the actual dimensions of the processed workpieces when a frequency of a variation in time of measurement of the actual dimensions successively obtained by said measuring device is higher than a threshold value, and the compensating value to be determined is more responsive to the change in the actual dimensions when the frequency of variation in the time of measurement is equal to or less than the threshold value; and

applying the compensating value to said machine control means.--

REMARKS

New claims 47-50 correspond to amended claims 39-42 as amended in applicants' Supplemental Reply Brief submitted on November 25, 1996, during the appeal of the parent application.

The Examiner and the Board refused to consider the Supplemental Reply Brief amendments to claims 39-42 during the course of the appeal of the parent. These

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claims subsequently were cancelled from the parent. Accordingly, applicants are submitting these claims as new claims 47-50 in the present Rule 53(b) continuation application.

These claims are patentable for the same reasons explained in regard to amended claims 39-42 in applicants' Supplemental Reply Brief in the appeal of the parent application.

In the Preliminary Amendment, applicants also are correcting certain minor oversights present in the specification and drawings, which also were corrected by amendment in the parent case.

If there is any fee due in connection with the filing of this Amendment, please charge the fee to our Deposit Account No. 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,
GARRETT & DUNNER, L.L.P.

By: _____
James W. Edmondson
Reg. No. 33,871

Date: January 8, 2001

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FIG. 17

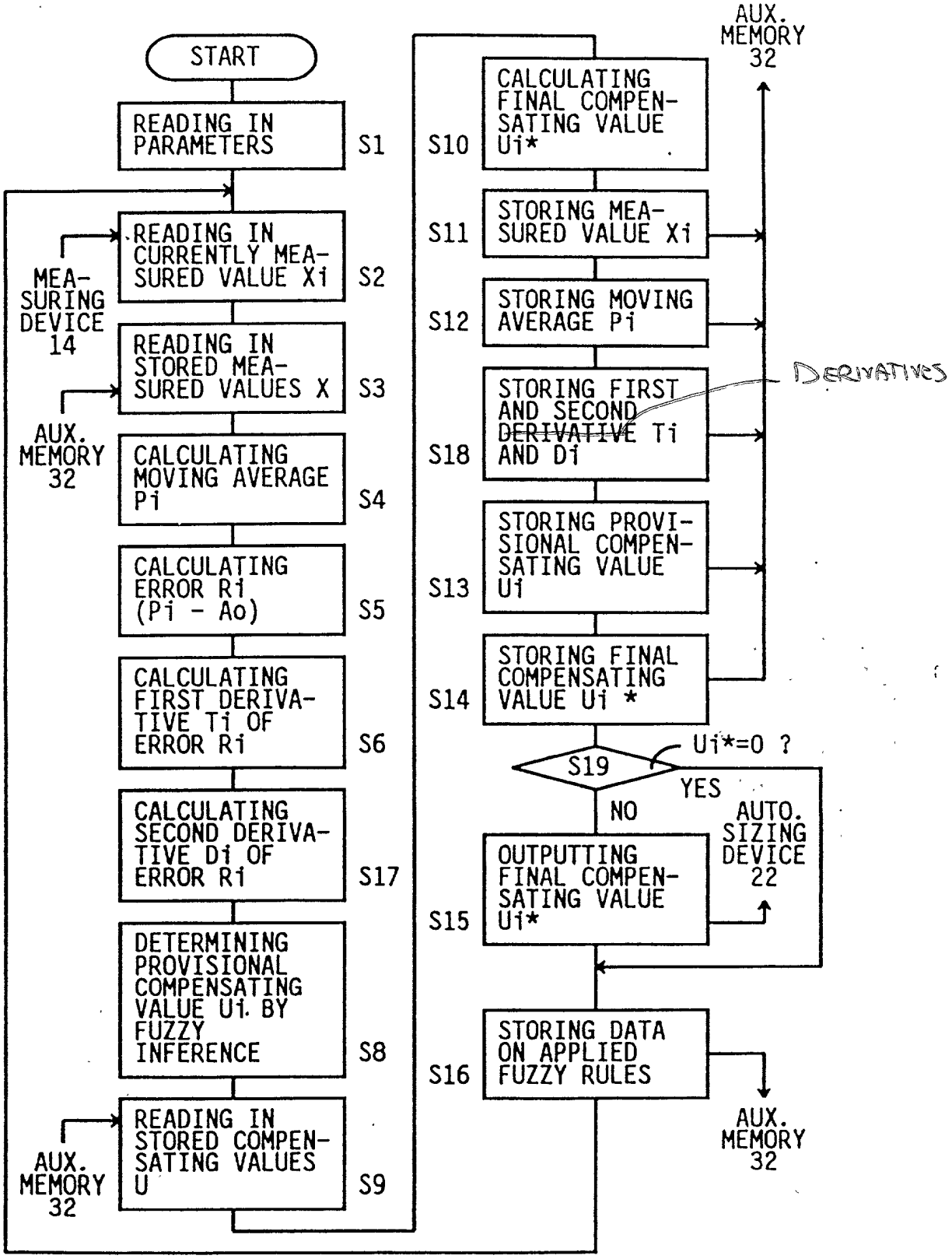

START
READING IN PARAMETERS
S1
READING IN CURRENTLY MEASURED VALUE Xi
S2
MEASURING DEVICE 14
READING IN STORED MEASURED VALUES X
S3
AUX. MEMORY 32
CALCULATING MOVING AVERAGE Pi
S4
CALCULATING ERROR Ri (Pi - Ao)
S5
CALCULATING FIRST DERIVATIVE Ti OF ERROR Ri
S6
CALCULATING SECOND DERIVATIVE Di OF ERROR Ri
S17
DETERMINING PROVISIONAL COMPENSATING VALUE Ui BY FUZZY INFERENCE
S8
READING IN STORED COMPENSATING VALUES U
S9
AUX. MEMORY 32
CALCULATING FINAL COMPENSATING VALUE Ui*
S10
AUX. MEMORY 32
STORING MEASURED VALUE Xi
S11
STORING MOVING AVERAGE Pi
S12
STORING FIRST AND SECOND DERIVATIVE Ti AND Di
S18
DERIVATIVES
STORING PROVISIONAL COMPENSATING VALUE Ui
S13
STORING FINAL COMPENSATING VALUE Ui *
S14
S19
Ui*=0 ?
YES
NO
AUTO. SIZING DEVICE 22
OUTPUTTING FINAL COMPENSATING VALUE Ui*
S15
STORING DATA ON APPLIED FUZZY RULES
S16
AUX. MEMORY 32

FIG. 34C

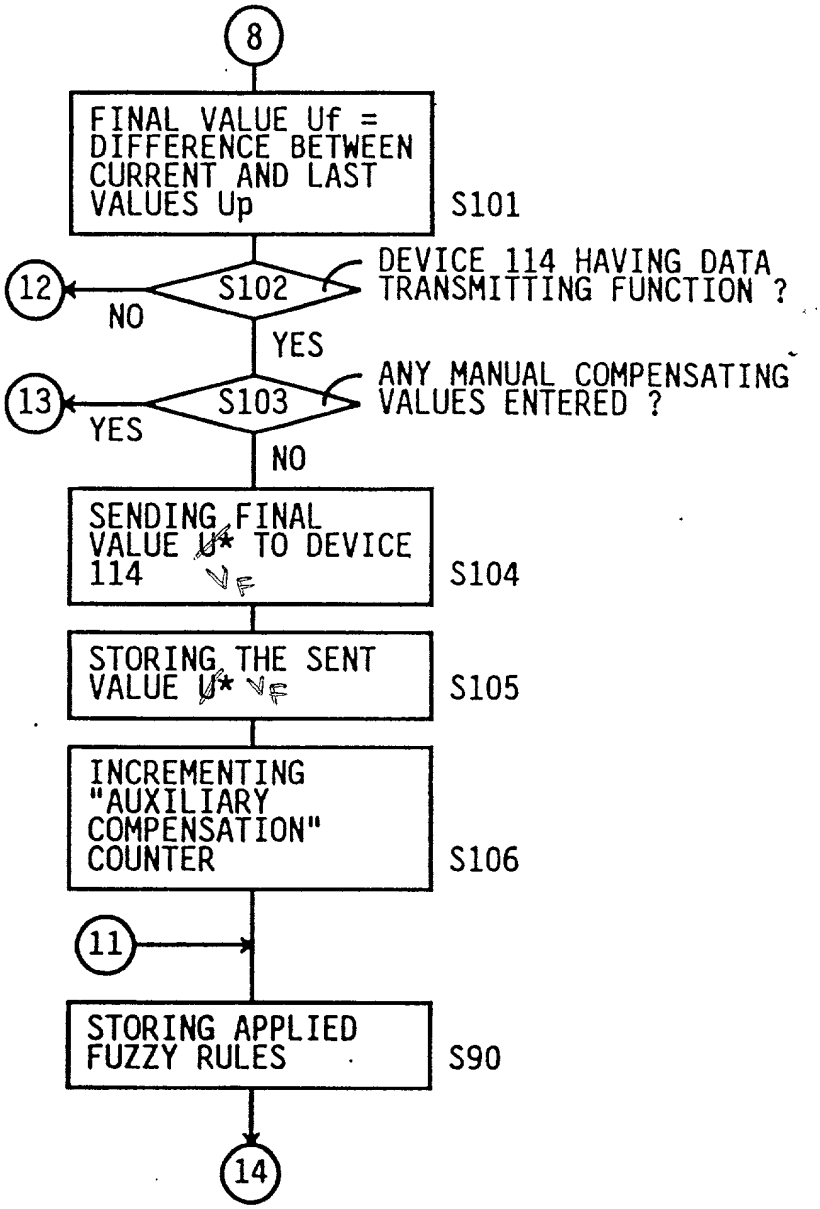
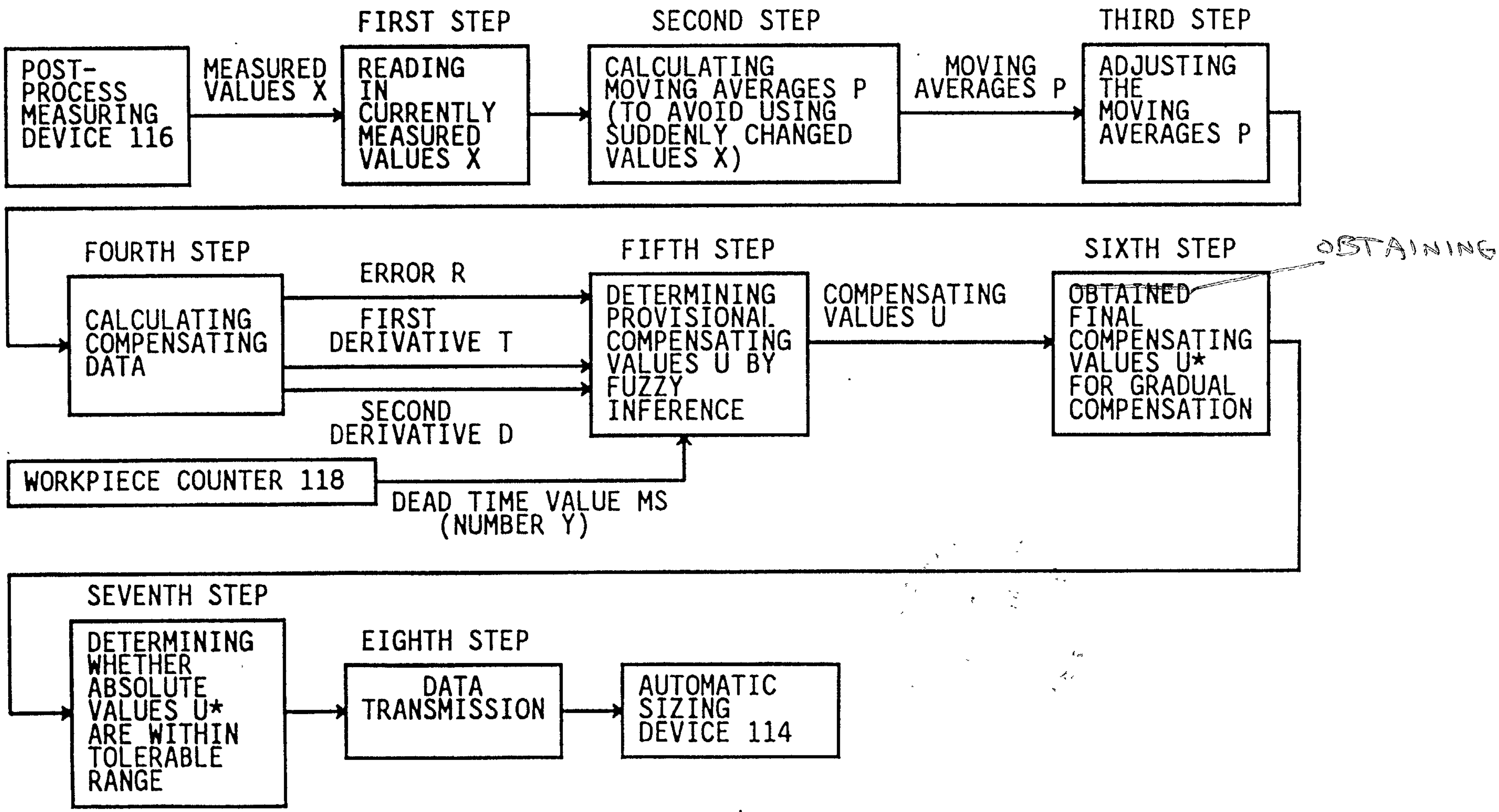

8
FINAL VALUE Uf = DIFFERENCE BETWEEN CURRENT AND LAST VALUES Up
S101
S102
DEVICE 114 HAVING DATA TRANSMITTING FUNCTION ?
12
NO
YES
S103
ANY MANUAL COMPENSATING VALUES ENTERED ?
13
YES
NO
SENDING FINAL VALUE U* TO DEVICE 114
S104
STORING THE SENT VALUE U*
S105
INCREMENTING "AUXILIARY COMPENSATION" COUNTER
S106
11
STORING APPLIED FUZZY RULES
S90
14

FIG. 36



POST-PROCESS MEASURING DEVICE 116
MEASURED VALUES X
FIRST STEP
READING IN CURRENTLY MEASURED VALUES X
SECOND STEP
CALCULATING MOVING AVERAGES P (TO AVOID USING SUDDENLY CHANGED VALUES X)
MOVING AVERAGES P
THIRD STEP
ADJUSTING THE MOVING AVERAGES P
FOURTH STEP
CALCULATING COMPENSATING DATA
ERROR R
FIRST DERIVATIVE T
SECOND DERIVATIVE D
FIFTH STEP
DETERMINING PROVISIONAL COMPENSATING VALUES U BY FUZZY INFERENCE
COMPENSATING VALUES U
SIXTH STEP
OBSTAINING
OBTAINED FINAL COMPENSATING VALUES U* FOR GRADUAL COMPENSATION
WORKPIECE COUNTER 118
DEAD TIME VALUE MS (NUMBER Y)
SEVENTH STEP
DETERMINING WHETHER ABSOLUTE VALUES U* ARE WITHIN TOLERABLE RANGE
EIGHTH STEP
DATA TRANSMISSION
AUTOMATIC SIZING DEVICE 114